

PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

To:

KIM, Won-Ho
7th Fl., Teheran Bd.
825-33 Yoksam-dong, Kangnam-ku
Seoul 135-080
RÉPUBLIQUE DE CORÉE

JUN 04 2002

Date of mailing (day/month/year) 03 April 2002 (03.04.02)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference OPP000458KR	
International application No. PCT/KR00/00664	International filing date (day/month/year) 26 June 2000 (26.06.00)

1. The following indications appeared on record concerning:

☒ the applicant ☒ the inventor ☐ the agent ☐ the common representative

Name and Address SON, Seog-Jae JANG, Ha-Soo	State of Nationality KR	State of Residence KR
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☒ the person ☐ the name ☐ the address ☐ the nationality ☐ the residence

Name and Address SON, Seog-Jae JANG, Ha-Soo	State of Nationality KR	State of Residence KR
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

3. Further observations, if necessary:

Corrected version of IB/306(12.12.01). The person in box No. 2 will be the applicant/inventor for US only.

4. A copy of this notification has been sent to:

☒ the receiving Office ☐ the designated Offices concerned
☐ the International Searching Authority ☒ the elected Offices concerned
☐ the International Preliminary Examining Authority ☐ other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Ki-Nam HA Telephone No.: (41-22) 338.83.38
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PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE

(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

KIM, Won-Ho
7th Fl., Teheran Bd.
825-33 Yoksam-dong, Kangnam-ku
Seoul 135-080
RÉPUBLIQUE DE CORÉE

Date of mailing (day/month/year) 12 December 2001 (12.12.01)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference OPP000458KR	
International application No. PCT/KR00/00664	International filing date (day/month/year) 26 June 2000 (26.06.00)

1. The following indications appeared on record concerning:

☒ the applicant ☐ the inventor ☐ the agent ☐ the common representative

Name and Address SON, Seog-Jae JANG, Ha-Soo	State of Nationality KR	State of Residence KR
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☐ the name ☐ the address ☐ the nationality ☐ the residence

Name and Address	State of Nationality KR	State of Residence KR
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒ the receiving Office ☐ the designated Offices concerned
☐ the International Searching Authority ☒ the elected Offices concerned
☐ the International Preliminary Examining Authority ☐ other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Ning XU Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE
in its capacity as elected Office

Date of mailing (day/month/year) 22 February 2001 (22.02.01)	Applicant's or agent's file reference OPP000458KR
International application No. PCT/KR00/00664	Priority date (day/month/year) 26 June 1999 (26.06.99)
International filing date (day/month/year) 26 June 2000 (26.06.00)	Applicant KANG, Hea-Chun

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
16 January 2001 (16.01.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Zakaria EL KHODARY Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION CONCERNING
AMENDMENTS OF THE CLAIMS(PCT Rule 62 and
Administrative Instructions, Section 417)

To:

Korean Intellectual Property Office
920 Dunsan-dong, So-gu
302-701 Daejeon Metropolitan City
RÉPUBLIQUE DE CORÉE

Date of mailing (day/month/year)

22 February 2001 (22.02.01)

in its capacity as International Preliminary Examining Authority

International application No.

PCT/KR00/00664

International filing date (day/month/year)

26 June 2000 (26.06.00)

Applicant

LG CHEMICAL LTD. et al

The International Bureau hereby informs the International Preliminary Examining Authority that no amendments under Article 19 have been received by the International Bureau (Administrative Instructions, Section 417).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer

Zakaria EL KHODARY

Telephone No. (41-22) 338.83.38

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NOTIFICATION OF CHANGE OF

☐ APPLICANT☒ INVENTORTo : Commissioner of
the Korean Industrial Property Office

International Application No.

PCT/KR00/00664

Applicant	Name	LG Chemical Ltd. et al.		Residence Reg. No.		Country of Nationality	Republic of Korea		
	Address	LG Twin Tower, Yoido-dong 20, Yongsungpo-ku, Seoul, 150-721, Republic of Korea							
Agent	Name	KIM, Won-Ho	Agent's Code	9-1998- 000023-8	Tel. No.	+82-2-3458-070			
	Address	Teheran Bd., 825-33, Yoksam-dong, Kangnam-ku, Seoul, Republic of Korea Fax: +82-2-553-5254 E-mail: email@youme.com							
Cause of Change		Addition of an inventor (SON, Seog-Jae, and JANG, Ha-Soo)							
Contents of Notifi- cation	Former	Name	KANG, Hea-Chun		Residence Reg. No.		Country of Nationality	Republic of Korea	
		Address	Deokil Hanmaeum Apt. 101-1205, Wooam-dong, Sangdang-ku, Cheongju city, Choongcheongbuk-do, 360-200, Republic of Korea						
	New	Name	SON, Seog-Jae		Residence Reg. No.		Country of Nationality	Republic of Korea	
		Address	LG Sataek A-404, Shinjeong 2-dong, 1182, Nam-ku, Ulsan-city 680-832, Republic of Korea						
		Designated State(s)		US only					
		Name	JANG, Ha-Soo		Residence Reg. No.		Country of Nationality	Republic of Korea	
		Address	Shindonga Apt. 3-403, Yeomchang-dong 289, Kangseo-ku, Seoul, 157-864, Republic of Korea						
		Designated State(s)		US only					
		Name	KANG, Hea-Chun		Residence Reg. No.		Country of Nationality	Republic of Korea	
		Address	Deokil Hanmaeum Apt. 101-1205, Wooam-dong, Sangdang-ku, Cheongju city, Choongcheongbuk-do, 360-200, Republic of Korea						
	Designated State(s)		US only						

Submitted hereby is a notification pursuant to Article 82 of the
Enforcement Regulations of the Patent Law.

Date(day/month/year) 07 November 2001 (07.11.2001)

Applicant (Agent) KIM, Won-Ho (Seal)



※ Attached Document(s) :

1. A copy of the document(s) substantiating the contents of notification (in case of notification by new applicant)
2. A certified copy of seal impression (in case of notification by new applicant)
3. A copy of the document(s) substantiating the power of attorney, if any

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NOTIFICATION OF CHANGE OF

☒ APPLICANT☐ INVENTORTo : Commissioner of
the Korean Industrial Property Office

International Application No.

PCT/KR00/00664

Applicant	Name	LG Chemical Ltd. et al.		Residence Reg. No.		Country of Nationality	Republic of Korea		
	Address	LG Twin Tower, Yoido-dong 20, Yongdungpo-ku, Seoul, 150-721, Republic of Korea							
Agent	Name	KIM, Won-Ho	Agent's Code	9-1998- 000023-8	Tel. No.	+82-2-3458-070			
	Address	Teheran Bd., 825-33, Yoksam-dong, Kangnam-ku, Seoul, Republic of Korea Fax: +82-2-553-5254 E-mail: email@youme.com							
Cause of Change		Assignment							
Contents of Notifi- cation	Former	Name	LG Chemical Ltd.		Residence Reg. No.		Country of Nationality	Republic of Korea	
		Address	LG Twin Tower, Yoido-dong 20, Yongdungpo-ku, Seoul, 150-721, Republic of Korea						
		Name	SON, Seog-Jae		Residence Reg. No.		Country of Nationality	Republic of Korea	
		Address	LG Sataek A-404, Shinjeong 2-dong, 1182, Nam-ku, Ulsan-city 680-832, Republic of Korea						
		Name	JANG, Ha-Soo		Residence Reg. No.		Country of Nationality	Republic of Korea	
		Address	Shindonga Apt. 3-403, Yeomchang-dong 289, Kangseo-ku, Seoul, 157-864, Republic of Korea						
		Name	KANG, Hea-Chun		Residence Reg. No.		Country of Nationality	Republic of Korea	
		Address	Deokil Hanmaeum Apt. 101-1205, Wooam-dong, Sangdang-ku, Cheongju city, Choongcheongbuk-do, 360-200, Republic of Korea						
	New	Name	LG Chemical Co., Ltd.		Residence Reg. No.		Country of Nationality	Republic of Korea	
		Address	LG Twin Tower, Yoido-dong 20, Youngdungpo-ku, Seoul, 150-721, Republic of Korea						
		Designated State(s)		All Designated States except US					
		Name	SON, Seog-Jae		Residence Reg. No.		Country of Nationality	Republic of Korea	
		Address	LG Sataek A-404, Shinjeong 2-dong, 1182, Nam-ku, Ulsan-city 680-832, Republic of Korea						
		Designated State(s)		US only					
		Name	JANG, Ha-Soo		Residence Reg. No.		Country of Nationality	Republic of Korea	
		Address	Shindonga Apt. 3-403, Yeomchang-dong 289, Kangseo-ku, Seoul, 157-864, Republic of Korea						
		Designated State(s)		US only					
		Name	KANG, Hea-Chun		Residence Reg. No.		Country of Nationality	Republic of Korea	
		Address	Deokil Hanmaeum Apt. 101-1205, Wooam-dong, Sangdang-ku, Cheongju city, Choongcheongbuk-do, 360-200, Republic of Korea						
		Designated State(s)		US only					

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Submitted hereby is a notification pursuant to Article 82 of the
Enforcement Regulations of the Patent Law.

Date(day/month/year) 13 November 2001 (13.11.2001)

Applicant (Agent) KIM, Won-Ho (Seal)



※ Attached Document(s) :

1. A copy of the document(s) substantiating the contents of notification (in case of notification by new applicant)
2. A certified copy of seal impression (in case of notification by new applicant)
3. A copy of the document(s) substantiating the power of attorney, if any

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NOTIFICATION OF CHANGE OF

☒ APPLICANT☐ INVENTORTo : Commissioner of
the Korean Industrial Property Office

International Application No.

PCT/KR00/00664

Applicant	Name	LG Chemical Ltd. et al.		Residence Reg. No.		Country of Nationality	Republic of Korea	
	Address	LG Twin Tower, Yoido-dong 20, Yongdungpo-ku, Seoul, 150-721, Republic of Korea						
Agent	Name	KIM, Won-Ho	Agent's Code	9-1998- 000023-8	Tel. No.	+82-2-3458-070		
	Address	Teheran Bd., 825-33, Yoksam-dong, Kangnam-ku, Seoul, Republic of Korea Fax: +82-2-553-5254 E-mail: email@youme.com						
Cause of Change		Change of the designated States of two of the applicants						
Contents of Notifi- cation	Former	Name	LG Chemical Ltd.		Residence Reg. No.		Country of Nationality	Republic of Korea
		Address	LG Twin Tower, Yoido-dong 20, Yongdungpo-ku, Seoul, 150-721, Republic of Korea					
		Name	SON, Seog-Jae		Residence Reg. No.		Country of Nationality	Republic of Korea
		Address	LG Sataek A-404, Shinjeong 2-dong, 1182, Nam-ku, Ulsan-city 680-832, Republic of Korea					
		Name	JANG, Ha-Soo		Residence Reg. No.		Country of Nationality	Republic of Korea
		Address	Shindonga Apt. 3-403, Yeomchang-dong 289, Kangseo-ku, Seoul, 157-864, Republic of Korea					
	New	Name	KANG, Hea-Chun		Residence Reg. No.		Country of Nationality	Republic of Korea
		Address	Deokil Hanmaeum Apt. 101-1205, Wooam-dong, Sangdang-ku, Cheongju city, Choongcheongbuk-do, 360-200, Republic of Korea					
		Name	LG Chemical Ltd.		Residence Reg. No.		Country of Nationality	Republic of Korea
		Address	LG Twin Tower, Yoido-dong 20, Yongdungpo-ku, Seoul, 150-721, Republic of Korea					
		Designated State(s)	All Designated States except US					
		Name	SON, Seog-Jae		Residence Reg. No.		Country of Nationality	Republic of Korea
		Address	LG Sataek A-404, Shinjeong 2-dong, 1182, Nam-ku, Ulsan-city 680-832, Republic of Korea					
		Designated State(s)	US only					
Name	JANG, Ha-Soo		Residence Reg. No.		Country of Nationality	Republic of Korea		
Address	Shindonga Apt. 3-403, Yeomchang-dong 289, Kangseo-ku, Seoul, 157-864, Republic of Korea							
Designated State(s)	US only							
Name	KANG, Hea-Chun		Residence Reg. No.		Country of Nationality	Republic of Korea		
Address	Deokil Hanmaeum Apt. 101-1205, Wooam-dong, Sangdang-ku, Cheongju city, Choongcheongbuk-do, 360-200, Republic of Korea							
Designated State(s)	US only							

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Submitted hereby is a notification pursuant to Article 82 of the
Enforcement Regulations of the Patent Law.

Date(day/month/year) 07 November 2001 (07.11.2001)

Applicant (Agent) KIM, Won-Ho (Seal)



※ Attached Document(s) :

1. A copy of the document(s) substantiating the contents of notification (in case of notification by new applicant)
2. A certified copy of seal impression (in case of notification by new applicant)
3. A copy of the document(s) substantiating the power of attorney, if any

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Power of Attorney

Agent (Common Representative)

Name : Patent Attorney KIM, Won-Ho
Address : Teheran Bldg., 825-33, Yoksam-dong,
Kangnam-ku, Seoul, 135-080 Republic of Korea

I/We, the undersigned, do hereby appoint the above-identified agent (common representative) as my/our agent/common representative to act for me/us in proceedings concerning all of my/our International Application set forth below.

International Application No. : PCT/KR00/00664

Title of Invention : DECORATIVE FLOOR COVERING COMPRISING
POLYETHYLENE TEREPHTHALATE FILM LAYER
IN SURFACE LAYER AND METHOD FOR
PREPARING THE SAME

This 12th day of Nov., 2001

Applicant Name : LG CHEMICAL CO., LTD.
Representative : NO, Ki-Ho



Address : LG Twin Tower, Yoido-dong 20, Youngdungpo-ku, Seoul,
150-721, Republic of Korea

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PATENT COOPERATION TREATY

PCT

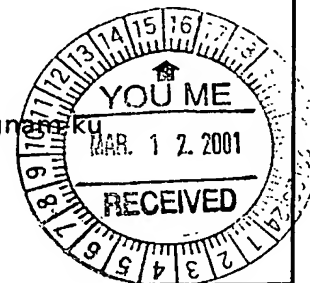
INFORMATION CONCERNING ELECTED
OFFICES NOTIFIED OF THEIR ELECTION

(PCT Rule 61.3)

From the INTERNATIONAL BUREAU

To:

KIM, Won-Ho
7th Fl., Teheran Bd.
825-33 Yoksam-dong, Kangnam-ku
Seoul 135-080
RÉPUBLIQUE DE CORÉE



Date of mailing (day/month/year) 22 February 2001 (22.02.01)		
Applicant's or agent's file reference OPP000458KR		IMPORTANT INFORMATION
International application No. PCT/KR00/00664	International filing date (day/month/year) 26 June 2000 (26.06.00)	
Applicant LG CHEMICAL LTD. et al		Priority date (day/month/year) 26 June 1999 (26.06.99)

1. The applicant is hereby informed that the International Bureau has, according to Article 31(7), notified each of the following Offices of its election:

EP : AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE
National : CN, JP, US

2. The following Offices have waived the requirement for the notification of their election; the notification will be sent to them by the International Bureau only upon their request:

National : BR

3. The applicant is reminded that he must enter the "national phase" before the expiration of 30 months from the priority date before each of the Offices listed above. This must be done by paying the national fee(s) and furnishing, if prescribed, a translation of the international application (Article 39(1)(a)), as well as, where applicable, by furnishing a translation of any annexes of the international preliminary examination report (Article 36(3)(b) and Rule 74.1).

Some offices have fixed time limits expiring later than the above-mentioned time limit. For detailed information about the applicable time limits and the acts to be performed upon entry into the national phase before a particular Office, see Volume II of the PCT Applicant's Guide.

The entry into the European regional phase is postponed until 31 months from the priority date for all States designated for the purposes of obtaining a European patent.

<p>The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No. (41-22) 740.14.35</p>	<p>Authorized officer:</p> <p>Zakaria EL KHODARY</p> <p>Telephone No. (41-22) 338.83.38</p>
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PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

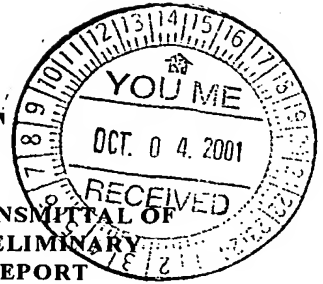
To:
KIM, Won Ho

7th Fl., Teheran Bldg., 825-33 Yoksam-dong, Kangnam-ku,
Seoul 135-080, Republic of Korea

PCT

**NOTIFICATION OF TRANSMITTAL OF
INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

(PCT Rule 71.1)



Date of mailing
(day/month/year) 28 SEPTEMBER 2001 (28.09.2001)

Applicant's or agent's file reference
OPP000458KR

IMPORTANT NOTIFICATION

International application No.

PCT/KR00/00664

International filing date (day/month/year)

26 JUNE 2000 (26.06.2000)

Priority date (day/months/year)

26 JUNE 1999 (26.06.1999)

Applicant

LG CHEMICAL LTD. et al

1. The applicant is hereby notified that International Preliminary Examining Authority transmits here with the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details in the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/KR

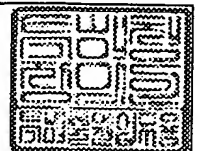
Korean Intellectual Property Office
Government Complex-Daejeon, Dunsan-dong, Seo-gu,
Daejeon Metropolitan City 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

COMMISSIONER

Telephone No. 82-42-481-5210



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PATENT COOPERATION TREATY

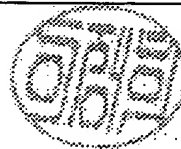
PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference OPP000458KR	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/KR00/00664	International filing date (day/month/year) 26 JUNE 2000 (26.06.2000)	Priority date (day/month/year) 26 JUNE 1999 (26.06.1999)
International Patent Classification (IPC) or national classification and IPC IPC7 B32B 27/18		
Applicant LG CHEMICAL LTD. et al		

1.	This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2.	This REPORT consists of a total of <u>3</u> sheets, including this cover sheet. <input type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT). These annexes consist of a total of _____ sheets.
3.	This report contains indications relating to the following items: I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application

Date of submission of the demand 16 JANUARY 2001 (16.01.2001)	Date of completion of this report 12 SEPTEMBER 2001 (12.09.2001)
Name and mailing address of the IPEA/KR Korean Intellectual Property Office Government Complex-Daejeon, Dunsan-dong, Seo-gu, Daejeon Metropolitan City 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer LEE, Jung Hee Telephone No. 82-42-481-5574 

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/KR00/00664

I. Basis of the report

1. With regard to the elements of the international application:*

- ☒ the international application as originally filed
- ☐ the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the claims:
pages _____, as originally filed
pages _____, as amended (together with any statement) under Article 19
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the drawings:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language English which is

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☒ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheet _____

5. ☐ This opinion has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed." and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.

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INTERNATIONAL PRELIMINARY EXAMINATION

International application No.

PCT/KR00/00664

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-31	YES
	Claims		NO
Inventive step (IS)	Claims	1-31	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-31	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

D1: JP-A-08-174783

D2: KR-A-97-33802

D3: KR-A-94-13816

Claims 1-31 meet the criteria set out in PCT Article 33(2)-(4), because the prior arts(D1 to D3) do not teach or fairly suggest a decorative floor covering comprising a surface layer and a substrate layer underneath, wherein the surface layer comprises a polyethylene terephthalate film layer, and a method of preparing the same, and any of the embodiments as specifically set forth in the claims.

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference OPP000458KR	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/KR00/00664	International filing date (<i>day/month/year</i>) 26 JUNE 2000 (26.06.2000)	(Earliest) Priority Date (<i>day/month/year</i>) 26 JUNE 1999 (26.06.1999)
Applicant LG CHEMICAL LTD. et al		

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (See Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawing** to be published with the abstract is Figure No. 2

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☐ None of the figures.

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INTERNATIONAL SEARCH REPORT

 International application No.
PCT/KR00/00664
A. CLASSIFICATION OF SUBJECT MATTER**IPC7 B32B 27/18**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 B32B 27/08, B32B 27/00, B32B 33/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Patents and Applications for Invention since 1975

Korean Utility Models and Applications for Utility Models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NPS, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 08-174783 A (Dainippon Printing Co., Ltd.) See Claim1-9, Fig.1-2	1
A	KR 97-33802 A (Hyundai Motor Co., Ltd.) See Abatract, Claim1-3	1
A	KR 94-13816 A (Lucky Co., Ltd.) See Abatract, Claim1-10, Fig.1-4	1

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

09 OCTOBER 2000 (09.10.2000)

Date of mailing of the international search report

10 OCTOBER 2000 (10.10.2000)

Name and mailing address of the ISA/KR

 Korean Industrial Property Office
Government Complex-Taejon, Dunsan-dong, So-ku, Taejon
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Facsimile No. 82-42-472-7140

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR00/00664

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 08-174783	09.07.96	None	
KR 97-33802	22.07.97	None	
KR 94-13816	16.07.94	None	

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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



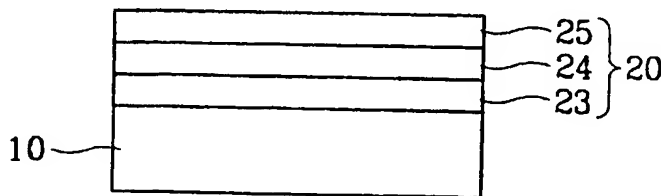
(43) International Publication Date
4 January 2001 (04.01.2001)

PCT

(10) International Publication Number
WO 01/00406 A1

- (51) International Patent Classification⁷: **B32B 27/18**
- (21) International Application Number: **PCT/KR00/00664**
- (22) International Filing Date: **26 June 2000 (26.06.2000)**
- (25) Filing Language: **Korean**
- (26) Publication Language: **English**
- (30) Priority Data:
1999/24426 26 June 1999 (26.06.1999) KR
2000/34772 23 June 2000 (23.06.2000) KR
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- (84) Designated States (regional): European patent (AT, BE,
CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,
NL, PT, SE).
- Published:**
— With international search report.
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: DECORATIVE FLOOR COVERING COMPRISING POLYETHYLENE TEREPHTHALATE FILM LAYER IN SURFACE LAYER AND MANUFACTURING METHOD OF THE SAME



(57) Abstract: The present invention provides a decorative floor covering comprising a surface layer and a substrate layer underneath, wherein the surface layer comprises a polyethylene terephthalate film layer, and a method for preparing the same. Furthermore, the present invention provides a decorative floor covering comprising a surface layer and a substrate layer underneath, wherein a light weight back layer is further comprised under the substrate layer, and a method for preparing the same. A decorative floor covering of the present invention is a decorative floor covering which has superior surface heat resistance, printing sharpness and realism, and it can be installed conveniently since not only can non-foamed polyvinyl chloride resin be used as a substrate layer, but also the weight of a floor covering is light when a light weight back layer is comprised under the substrate layer.

WO 01/00406 A1

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(19) World Intellectual Property Organization
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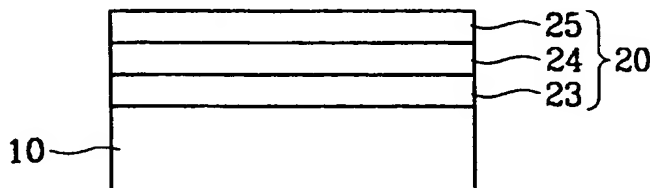
(43) International Publication Date
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PCT

(10) International Publication Number
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- (26) Publication Language: **English**
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2000/34772 ✓ 23 June 2000 (23.06.2000) KR
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- (81) Designated States (national): **BR, CN, JP, US.**
- (84) Designated States (regional): **European patent (AT, BE,
CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,
NL, PT, SE).**
- Published:**
— With international search report.
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(57) Abstract: The present invention provides a decorative floor covering comprising a surface layer and a substrate layer underneath, wherein the surface layer comprises a polyethylene terephthalate film layer, and a method for preparing the same. Furthermore, the present invention provides a decorative floor covering comprising a surface layer and a substrate layer underneath, wherein a light weight back layer is further comprised under the substrate layer, and a method for preparing the same. A decorative floor covering of the present invention is a decorative floor covering which has superior surface heat resistance,

printing sharpness and realism, and it can be installed conveniently since not only can non-foamed polyvinyl chloride resin be used as a substrate layer, but also the weight of a floor covering is light when a light weight back layer is comprised under the substrate layer.

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**DECORATIVE FLOOR COVERING COMPRISING POLYETHYLENE
TEREPHTHALATE FILM LAYER IN SURFACE LAYER AND
MANUFACTURING METHOD OF THE SAME**

5 **CROSS REFERENCE TO RELATED APPLICATION**

This application is based on Korean patent application Nos. 10-1999-0024426 and 10-2000-0034772 filed on June 26, 1999 and June 23, 2000 respectively, which are incorporated hereinto by reference.

10 **BACKGROUND OF THE INVENTION**

(a) Field of the Invention

The present invention relates to a decorative floor covering, more particularly to a decorative floor covering comprising a polyethylene terephthalate film layer in a surface layer, and a manufacturing method of the
15 same.

(b) Description of the Related Art

As demands for convenience and health functions in home environments increase in conjunction with recent income level improvements, the need for light weight decorative floor coverings and various functional
20 products used in a common residence or commercial space tends to be increasing.

A decorative floor covering which is installed in common residences and a semi-commercial spaces provides simple functionalities such as durability, stain resistance and fashion characteristics.

Methods for printing decorative patterns in conventional decorative floor coverings include directly printing patterns on a polyvinyl chloride resin sheet, directly printing patterns on a substrate layer comprising glass fiber etc., and transferring printed patterns on paper or polyester film to a polyvinyl chloride resin sheet surface. However, there have been problems in that these methods do not satisfy human desires for natural patterns without leaving artificial traces. Particularly, although effects of a pattern which is printed on paper or polyester transfer paper is superior, there have been problems in that realism decreases since pattern changes occur after transfer. Furthermore, although a polyvinyl chloride resin layer is formed by adding fillers to a polyvinyl chloride resin sheet layer to raise the transferring effects since complete transfer does not occur due to transferring surface irregularities, the transferred patterns deteriorate due to the fillers.

Secondly, conventional decorative floor coverings in which an olefin resin skin layer such as a transparent polyvinyl chloride resin, polyethylene, etc. is used on a printing layer so as to protect the printing layer tend to generate microscopic air pockets during processing, so a yellowing phenomenon occurs due to the heat changes during processing. In addition, a certain thickness should be maintained in order to provide durability during use, resulting in the problem that transparency is further deteriorated due to the thickness.

Thirdly, polyvinyl chloride resin has problems of poor heat resistance in that the surface is easily damaged by a heat source of over 100 °C due to its low softening point of 80 to 100 °C.

Although there have been cases that non-foaming polyvinyl chloride resin or other materials have been used as a skin layer to improve heat resistance, problems of heat resistance have not been fundamentally solved.

Furthermore, a non-foaming polyvinyl chloride resin layer has been
5 used under a conventional decorative floor covering as a balance layer, and there have been installing problems since the product weight is increased due to the resin layer.

FIG. 1 is a cross-sectional view of a conventional decorative floor covering, wherein a substrate impregnated layer 1 is positioned in the middle,
10 a non-foaming chip layer 21 having a pastel tone and decorative patterns, a durability provided polyvinyl chloride resin skin layer 22, and a durability and heat resistance provided surface treated layer 25 are positioned in order on the substrate impregnated layer 1, and a balance layer 31 which maintains product balance is positioned under the substrate impregnated layer 1.

15 The above conventional decorative floor coverings are manufactured by a method comprising the steps of heat pressing and gelling after fully impregnating glass fiber, pulp, etc. having large pores into a polyvinyl chloride resin sol to make a substrate impregnated layer 1, forming polyvinyl chloride resin chips on non-foamed chips 21 by applying heat after coating
20 calcium carbonate (CaCO_3) contained polyvinyl chloride resin chips having 5 to 7 colors to a thickness of 1.0 to 1.5 mm on the substrate impregnated layer 1 using a rotary screen roll, laying up a transparent polyvinyl chloride resin sheet on the non-foamed chips 21 as a skin layer 22, laying up a calcium carbonate filled polyvinyl chloride resin sheet under the substrate

impregnated layer 1 as a balance layer 31, and forming a surface treated layer 25 by curing after coating urethane acryl resin, etc. on the skin layer 22.

The conventional decorative floor coverings having these structures have problems in that realism is decreased in the decorative patterns of the non-foamed chip layer 21, transparency of the durability providing polyvinyl chloride resin skin layer 22 is decreased, and its heat resistance is insufficient.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a decorative floor covering having a superior heat resistant surface and a method for manufacturing the same, considering problems of the conventional technologies.

It is another object of the present invention to provide a decorative floor covering having superior surface printing sharpness and realism, and a method for manufacturing the same.

It is another object of the present invention to provide a light weight decorative floor covering which can be installed conveniently since non-foamed polyvinyl chloride resin is used as a substrate layer, and a method for manufacturing the same.

In order to accomplish the above objects, the present invention provides a decorative floor covering comprising a surface layer and a substrate layer, wherein the surface layer comprises a polyethylene terephthalate film layer.

Furthermore, the present invention provides a decorative floor

covering comprising a surface layer and a substrate layer, wherein a light back layer is further comprised underneath the substrate layer.

BRIEF DESCRIPTION OF THE DRAWINGS

5 A more complete appreciation of the invention, and many of the attendant advantages thereof, will be readily apparent as the same becomes better understood by reference to the following detailed description when considered in conjunction with the accompanying drawings, wherein:

FIG. 1 is a cross-sectional view of a conventional decorative floor
10 covering;

FIG. 2 is a cross-sectional view of the decorative floor covering of
EXAMPLE 1;

FIG. 3 is a cross-sectional view of a decorative floor covering in
which a glass fiber scrim or a woven or non-woven glass fiber is interposed in
15 the middle of a polyvinyl chloride resin substrate layer of the present
invention;

FIG. 4 is a cross-sectional view of the decorative floor covering of
EXAMPLE 2;

FIG. 5 is a cross-sectional view of the decorative floor covering of
20 EXAMPLE 3; and

FIG. 6 is a cross-sectional view of the decorative floor covering of
EXAMPLE 4.

DETAILED DESCRIPTION OF THE INVENTION

In the following detailed description, only the preferred embodiments

of the invention have been shown and described, simply by way of illustration of the best mode contemplated by the inventor(s) of carrying out the invention. As will be realized, the invention is capable of modification in various obvious respects, all without departing from the invention.

- 5 Accordingly, the description is to be regarded as illustrative in nature, and not restrictive.

The present invention is described in detail as following.

The present invention is a decorative floor covering downwardly comprising a surface layer 20 with a polyethylene terephthalate film having
10 superior transparency, heat resistance, durability, and chemical resistance, and a polyvinyl chloride substrate layer 10 having a high filler content. That is, it is an aim that at the point when a high temperature is applied to the surface of conventional polymer plastic floor coverings, the high temperature is transferred so that not only do carbonization phenomena not occur, but the
15 heat is transferred very quickly. So, a UV coated polyethylene terephthalate film having superior heat resistance is used in the surface layer 20, and polyvinyl chloride resin having a high filler content is used as a substrate so as to swiftly transfer a high temperature applied to the floor covering surface so that the decorative floor covering surface is not carbonized even at a high
20 temperature. Furthermore, patterns of a decorative floor covering are vividly expressed using superior transparency and printability of a polyethylene terephthalate film.

Therefore, printing sharpness and realism are high and heat resistance is improved in a decorative floor covering of the present invention.

The present invention is described in detail with drawings as follows.

FIG. 2 is a cross-sectional view illustrating one embodiment of the present invention, wherein a polyvinyl chloride resin substrate layer 10 is disposed in a decorative floor covering, and a surface layer 20 is disposed on the substrate layer 10. The surface layer 20 can be further subdivided. That is, the surface layer 20 comprises a surface treated layer 25 on a polyethylene terephthalate film layer 24, and a polyvinyl chloride resin intermediate layer 23 under that.

A method for manufacturing a decorative floor covering of FIG. 2 basically comprises the steps of:

- a) manufacturing a polyvinyl chloride resin substrate layer 10;
- b) manufacturing a pressed sheet by laying up a polyvinyl chloride resin intermediate layer 23 on the substrate layer 10, applying pressure, and pressing;
- 15 c) manufacturing a half-finished sheet by laying up a polyethylene terephthalate film layer 24 under which a certain pattern is printed on the pressed sheet of step b), applying pressure, and pressing; and
- d) forming a surface treated layer 25 by UV curing after coating a surface treated layer 25 composition on the half-finished sheet of step c).
- 20

In the pressing of step b) and step c), the pressing objects are preferably preheated to a temperature of 140 to 170 °C before laying up, and the applied pressure is preferably from 3 to 10 kgf/cm² during pressing.

The polyvinyl chloride resin substrate layer 10 fulfils its function to dissipate heat applied to the top of the surface layer 20, and it is manufactured by adding a high amount of fillers. Usable fillers include one or more inorganic fillers selected from the group consisting of calcium carbonate, talc, wollastonite, and silica, one or more metallic powders selected from the group consisting of aluminum, copper, and iron, and a mixture thereof. In the fillers used, an inorganic filler is preferably from 50 to 400 weight parts based on 100 weight parts of polyvinyl chloride resin, and a metallic powder is preferably from 5 to 30 weight parts based on 100 weight parts of polyvinyl chloride resin. In order to improve processabilities of a calender, the consumed amount can be increased 2 to 5 times more by processing after premixing a metallic powder, a resin, and a plasticizer than when a metallic powder alone is used.

A preferable method embodiment for manufacturing a polyvinyl chloride resin substrate layer 10 is manufacturing a sheet by adding a plasticizer for reinforcing product flexibility, 30 to 50 weight parts of dioctyl phthalate, heat resistant stabilizers for providing heat resistant stabilities, 3 to 5 weight parts of a barium-zinc based compound and 3 to 5 weight parts of epoxy compound, a filler for providing product hardness and heat resistant dispersibility, 50 to 400 weight parts of calcium carbonate (CaCO_3), and 3 to 5 weight parts of pigment for imparting surface colors, to 100 weight parts of polyvinyl chloride resin, fully kneading at a rolling mill at 160 to 190 °C, and rolling to a thickness of 0.8 to 1.3 mm.

Preferably 50 to 400 weight parts of a calcium carbonate filler are

used based on 100 weight parts of polyvinyl chloride resin since the higher the content of calcium carbonate, not only does the heat conductivity increase, but also press marks caused by heavy objects such as furniture used in everyday life are minimized due to an increased surface hardness.

5 However, when 400 or more weight parts of calcium carbonate are used based on 100 weight parts of polyvinyl chloride resin, the polyvinyl chloride resin does not chemically bond with the calcium carbonate, weakening the cohesion of the polyvinyl chloride resin resulting in a processibility decrease, even though it is profitable in the aspect of manufacturing cost.

10 Furthermore, glass fiber scrim, or woven or nonwoven long glass fiber11 can be interposed in the middle of the polyvinyl chloride resin substrate layer 10 for dimensional stability, wherein the interposition method is pressing and applying pressure of 3 to 10 kgf/cm² at an embossing roll under the state of latent heat of 100 to 150 °C after rolling the first polyvinyl
15 chloride resin sheet at a calender. Thereafter, the second polyvinyl chloride resin sheet is pressed under a glass scrim layer, or a woven or nonwoven glass fiber 11, thus interposing it inside a polyvinyl chloride resin substrate layer 10, and the second polyvinyl chloride resin sheet under which a separate light back layer 30, usually a fiber layer 35, can be attached in
20 advance.

A structure of a decorative floor covering of the present invention in which a glass fiber scrim or woven or nonwoven glass fiber 11 is interposed in a polyvinyl chloride resin substrate layer 10 is illustrated in FIG. 3 and FIG.

4.

The polyvinyl chloride resin intermediate layer 23, which is used on a polyvinyl chloride resin substrate layer 10 so that color of a substrate layer 10 can be concealed in order to support printed pattern sharpness and realism of an upper surface layer 20 has the additional function of dissipating heat when heat is applied to the upper surface layer 20, and it also transfers heat to the polyvinyl chloride resin substrate layer 10 positioned underneath.

For this, a 0.1 to 1 mm thick sheet is manufactured by rolling a polyvinyl chloride resin composition comprising 100 weight parts of polyvinyl chloride resin, 25 to 50 weight parts of dioctyl phthalate, 50 to 150 weight parts of calcium carbonate, 3 to 5 weight parts of titanium oxide, and 2 to 5 weight parts of heat stabilizer in a calender.

More particularly, after adding 25 to 50 weight parts of dioctyl phthalate plasticizer for reinforcing product flexibility, 2 to 5 weight parts of barium-zinc (Ba-Zn) based stabilizer and 2 to 5 weight parts of epoxy stabilizer heat resistant stabilizers for providing heat resistant stability, 50 to 150 weight parts of inorganic filler such as calcium carbonate etc. for providing product hardness and heat resistant dispersibility, and 3 to 5 weight parts of titanium oxide (TiO_2) pigment for making the surface color white, to a main raw material of polyvinyl chloride and sufficiently kneading at a rolling roll at 160 to 190 °C, a polyvinyl chloride resin intermediate layer 23 is manufactured by rolling to 0.1 to 1 mm, more preferably to a 0.1 to 0.2 mm thickness in a calender.

The polyethylene terephthalate film layer 24, under which highly realistic and vivid decorative patterns are printed by a printing method such

as gravure printing method, etc., is positioned on the polyvinyl chloride resin intermediate layer 33.

It is preferable to use this polyethylene terephthalate film layer 24 after coating a primer selected from the group consisting of polyvinyl acetate based, polyurethane acrylate based, and ethylenevinyl acetate based primers to a coating thickness of 0.1 to 10 μm for adhesion to an UV surface treated layer 25 positioned at the upper surface of the film layer and to a polyvinyl chloride resin intermediate layer 23 positioned under the film layer.

Printing certain patterns on a polyethylene terephthalate film layer 24 is possible before or after the primer treatment, and the polyethylene terephthalate film layer is used during pressing by winding on a paper pipe, steel pipe, etc. after manufacturing. Furthermore, printing can be done on the polyvinyl chloride resin intermediate layer 23 as opposed to the polyethylene terephthalate film layer 24.

A thickness of a polyethylene terephthalate film layer 24 is preferably from 10 to 100 μm , because when the polyethylene terephthalate film is thinner than 10 μm the printing surface is expanded by tension during laying-up, and when it is thicker than 100 μm product surface folding occurs when the product is folded since polyethylene terephthalate film has low flexibility when it is thicker than 100 μm .

The surface treated layer 25 which is used to provide stain resistance or durability synergistic effects is formed by coating an UV surface treated layer 25 composition on the polyethylene terephthalate film layer 24, and

curing with ultraviolet rays, etc. A UV surface treated layer 25 composition is preferably selected from the group consisting of urethane acrylate, silicone acrylate, and epoxy acrylate, and preferably further comprising acryl based or urethane based beads having a particle size of 5 to 20 μm , in order to
5 maintain the heat resistant function. It is cross linking cured with ultraviolet rays or electron beams: urethane acryl resin is cured by ultraviolet ray irradiation depending on composition, and aqueous urethane resin can be cured with heat.

Ease of installation can be provided by additionally using a cork
10 balance layer 33 as a light back layer 30, or a wooden powder balance layer 34, or a fabric layer 35 underneath the polyvinyl chloride resin substrate layer 10, thus reducing the weight of the decorative floor covering while maintaining the same total thickness. The light back layer 30 consisting of a cork balance layer 33, wooden powder balance layer 34, or a fabric layer 35
15 can provide anti-insect effects, heat insulating effects, a humidity controlling function, and impact absorbing effects as well.

For this, the cork balance layer 33 is manufactured in a sheet which is cut to a thickness of 1.0 to 2.0 mm using a slicing machine after a cork layer of a natural tree is peeled off, and pulverized to a particle size of 5 to 10
20 meshes, put into a large cylinder together with adhesive, and bonded by applying pressure. A cork having preferably 2% or less moisture content is used since a higher moisture content causes higher contraction or expansion due to heat. A cork balance layer 33 can be manufactured to a thickness of 3.0 to 4.0 mm so as to further improve performance aspects such as sound

insulation, impact absorption, etc. This cork balance layer 33 can improve the installation property of product weight since its specific gravity is over 8 to 10 times less than a polyvinyl chloride resin sheet containing general inorganic materials.

5 Furthermore, the wooden powder balance layer 34 which maintains the product balance and provides anti-insect effects, heat insulating effects, a humidity controlling function, impact absorbing effects, etc. is manufactured in a sheet which is rolled to a thickness of 0.8 to 1.0 mm using a two sets of pressure rolls after adding 100 to 150 weight parts of wooden powder having
10 a particle size of 200 to 300 meshes, 3 to 5 weight parts of heat resistant barium-zinc based compound as a stabilizer, 1 to 3 weight parts of internal antiadditive stearic acid, 30 to 50 weight parts of plasticizer dioctyl phthalate, and 3 to 5 weight parts of other pigment to 100 weight parts of polyvinyl chloride resin, and kneading it together, wherein the wooden powder is
15 coating treated to prevent moisture absorption with 30 to 50 weight% of surfactant, based on the wooden powder weight. Polyethylene glycol, polybutyl glycol, polymethyl glycol, polymethyl propylene glycol, etc. can be used as a surfactant. Furthermore, surfactants having preferably 2% or less moisture content are used since severe contraction or expansion by heat can
20 occur when moisture content is higher. The wooden powder balance layer 34 can be manufactured to a thickness of 3.0 to 4.0 mm to further improve functionality aspects such as sound insulation, impact absorption, etc. This wooden powder balance layer 34 can improve the installation property of product weight since its specific gravity is over 8 to 10 times less than a

polyvinyl chloride resin sheet containing general inorganic materials.

Furthermore, the fiber layer 35 which prevents product deformation by dimensional change and provides the product with lightness uses woven or nonwoven polyester, woven or nonwoven polypropylene, woven or
5 nonwoven glass fiber, etc. This fabric layer 35 is used by fixing it with an adhesive after coating a plastisol such as polyvinyl chloride, etc. under the polyvinyl chloride resin substrate layer 10, and simultaneously gelling the sol and pressing with the fiber layer 35, or preparing it under the cork balance layer 33 or the wooden powder balance layer 34. The woven thickness of
10 the fiber layer 35 is preferably from 10s x 10s to 25s x 15s, and the density is preferably from 20 x 20 to 30 x 30 roll/inch.

This light back layer 30 is adhered under the polyvinyl chloride resin substrate layer 10 using an adhesive. The adhesive layer 32 is preferably a sheet or impregnated sheet which is rolled to a thickness of 0.03 to 0.2 mm
15 by a 4 roll calender roll or an extruder at a temperature of 80 to 160 °C using urethane resin, acryl resin, vinyl acetate resin, etc. considering the melting point of each resin, and a light back layer 30 can be adhered by separately coating a plastisol such as polyvinyl chloride, etc. under a polyvinyl chloride resin substrate layer 10 and using this gelled sol. In case of using a rolled
20 sheet or an impregnated sheet as an adhesive layer 32, a pressed product or half-finished product to be adhered is preheated, an adhesive layer 32 is positioned under a substrate layer 10, laid up, and pressed with a pressure of 3 to 10 kg/cm₂.

A decorative floor covering of the present invention is manufactured

by the various manufacturing methods depending on the application method of the light back layer 30. These manufacturing methods can be represented in the following various embodiments in addition to the above described basic manufacturing method.

5 One embodiment of a manufacturing method of a decorative floor covering of the present invention comprises the steps of:

- a) manufacturing the first polyvinyl chloride resin substrate layer 10;
- b) pressing by applying pressure in a embossing roll after positioning
10 a glass fiber scrim, or a woven or unwoven glass fiber 11
 underneath the first substrate layer 10 under the condition that a
 surface of the first polyvinyl chloride resin substrate layer 10 of
 step a) maintains latent heat of 100 to 150 °C;
- c) manufacturing the second polyvinyl chloride resin substrate layer
 10;
- 15 d) coating a plastisol underneath the second polyvinyl chloride resin
 substrate layer 10, positioning a light back layer 30 of a fiber layer
 35, applying pressure, and pressing with a press roll at a heating
 drum at 140 to 150 °C;
- e) manufacturing a polyvinyl chloride resin intermediate layer 23;
- 20 f) manufacturing a pressed sheet by applying pressure at a press
 after downwardly positioning a polyvinyl chloride resin intermediate
 layer 23, the first polyvinyl chloride resin substrate layer 10 under
 which glass fiber scrim, or woven or unwoven glass fiber 11 is
 pressed, the second polyvinyl chloride resin substrate layer 10

under which a light back layer 30 of a fiber layer 35 is pressed,
and preheating to a temperature of 140 to 170 °C;

- g) manufacturing a half-finished sheet by applying pressure and pressing at an embossing roll after preheating the pressed sheet of step f) to a temperature of 140 to 170 °C and positioning a polyethylene terephthalate film layer 24 on a polyvinyl chloride resin intermediate layer 23; and
- h) forming a surface treated layer 25 by UV (ultraviolet ray) curing after coating a surface treated layer 25 composition on the half-finished sheet of step g).

Another embodiment of a manufacturing method of a decorative floor covering of the present invention comprises the steps of:

- a) manufacturing a polyvinyl chloride resin substrate layer 10;
- b) laying up a polyvinyl chloride resin intermediate layer 23 on the preheated substrate layer 10 of step a), applying pressure, and pressing;
- c) manufacturing a half-finished sheet by laying up a polyethylene terephthalate film layer 24 on the preheated polyvinyl chloride resin intermediate layer 23 of step b), applying pressure, and pressing;
- d) laying up an adhesive layer 32 underneath the preheated half-finished sheet of step c), applying pressure, and pressing;
- e) laying up a light back layer 30 underneath the adhesive layer 32 of step d), applying pressure, and pressing; and
- f) forming a surface treated layer 25 after coating a surface treated

layer 25 composition on the pressed polyethylene terephthalate film layer 24 of step e), and curing.

In the manufacturing method, a method for laying up and pressing a light back layer 30 can be selected from a method for laying up and pressing a fabric layer 35 underneath a wooden powder balance layer 34 after laying up and pressing a cork balance layer 33 underneath an adhesive layer 32, or laying up and pressing a wooden powder balance layer 34 underneath an adhesive layer 32.

In the manufacturing methods, the preheating in each step is carried out at a temperature preferably from 140 to 170 °C considering the melting point of polyvinyl chloride resin, and an applying pressure during pressing after preheating is preferably from 3 to 10 kg/cm².

A surface treated layer 25, a polyethylene terephthalate film layer 24, a polyvinyl chloride resin intermediate layer 23, a substrate layer 10, and an adhesive layer 32 in a decorative floor covering of the present invention are manufactured in a thickness preferably from 1 to 1.5 mm.

The present invention is described further in detail through the following EXAMPLES and COMPARATIVE EXAMPLES. However, the following EXAMPLES are only for exemplifying the present invention, and the present invention is not limited to the following EXAMPLES.

[EXAMPLES]

EXAMPLE 1

(Manufacturing of a polyvinyl chloride resin substrate layer 10)

A polyvinyl chloride resin substrate layer 10 sheet having a thickness

of 0.75 mm was manufactured by kneading 100 weight parts of polyvinyl chloride resin having a degree of polymerization of 1000, 42 weight parts of dioctyl phthalate, 250 weight parts of calcium carbonate powder, and 2 weight parts of heat resistant stabilizer in a Banbury mixer, and rolling the
5 softened and molten compound with a calender at 130 to 170 °C.

(Manufacturing of a polyvinyl chloride resin intermediate layer 23)

A polyvinyl chloride resin intermediate layer 23 sheet having a thickness of 0.1 mm was manufactured by kneading 100 weight parts of polyvinyl chloride resin having a degree of polymerization of 1000, 38 weight
10 parts of dioctyl phthalate, 90 weight parts of calcium carbonate powder, 2.5 weight parts of heat resistant stabilizer, and 10 weight parts of titanium oxide in a Banbury mixer, and rolling the softened and molten compound with a calender at 130 to 170 °C.

(Pressing of a polyvinyl chloride resin intermediate layer 23)

15 After preheating the manufactured polyvinyl chloride resin substrate layer 10 sheet at a temperature of 150 to 170 °C, a polyvinyl chloride resin intermediate layer 23 was positioned on the preheated substrate layer 10, laid up, and pressed at a pressure of 3 to 6 kg/cm².

(Manufacturing of a polyethylene terephthalate film layer 24)

20 Certain patterns were imparted in the gravure printing method under a polyethylene terephthalate film (SG88 manufactured by SK Corporation) having a thickness of 50 μ m on both sides of which an acryl and polyester based primer is treated to an average thickness of 0.5 μ m.

(Pressing of a polyethylene terephthalate film layer 24)

After preheating a sheet in which a polyvinyl chloride resin intermediate layer 23 was pressed on the manufactured polyvinyl chloride resin substrate layer 10 sheet at a temperature of 150 to 170 °C, the
5 polyethylene terephthalate film layer 24 under which certain patterns were imparted was positioned on the preheated sheet, laid up, and pressed at a pressure of 3 to 6 kg/cm².

(Heat resistant UV (ultraviolet rays) coating treatment)

A urethane acrylate based heat resistant UV treating agent in which
10 a heat resistant stabilizer and acryl beads were added and contained was coated on the polyethylene terephthalate film layer 24 pressed sheet to a coating thickness of 25 μ m, cured by an UV lamp in the non-oxygen curing method, thus forming a heat resistant UV coating layer 25 on the uppermost layer. This manufactured decorative floor covering is illustrated in FIG. 2.

15 EXAMPLE 2

(Manufacturing of a polyvinyl chloride resin substrate layer 10)

The same polyvinyl chloride resin substrate layer 10 sheet as in the EXAMPLE 1 was manufactured.

(Attaching of woven cloth 30)

20 After coating a polyvinyl chloride sol (plastisol) under the polyvinyl chloride resin substrate layer 10 sheet, a polyester woven cloth (thickness: 20s x 20s, density: 25 x 25 /inch) was positioned and pressed with a press roll at a heating drum at 140 to 150 °C.

(Pressing of glass fiber scrim 11)

One polyvinyl chloride resin substrate layer 10 sheet was additionally manufactured by rolling a polyvinyl chloride substrate layer 10 sheet using a calender in the same method as in the EXAMPLE 1, and pressed by applying
5 pressure while passing the sheet and glass fiber scrim (average weight of 200 g/m^2) which is positioned underneath the sheet through an embossing roll (pressure of 10 kgf/cm^2) in the state of sheet formation, i.e., in the state that a latent sheet surface temperature of 100 to $120 \text{ }^\circ\text{C}$ is maintained.

(Manufacturing of a polyvinyl chloride resin intermediate layer 23)

10 The same polyvinyl chloride resin intermediate layer 23 as in the EXAMPLE 1 was manufactured.

Each of a polyvinyl chloride intermediate layer 23, a polyvinyl chloride resin substrate layer 10 sheet under which a glass fiber scrim 11 is pressed, and a polyvinyl chloride resin substrate layer 10 sheet under which
15 polyester woven cloth is pressed were respectively preheated to a temperature of 140 to $170 \text{ }^\circ\text{C}$, downwardly positioned in order, laid up, and pressed by passing through an embossing roll at $160 \text{ }^\circ\text{C}$ (pressure of 10 kgf/cm^2).

(Manufacturing of a polyethylene terephthalate film layer 24)

20 The same polyethylene terephthalate film layer 24 as in the EXAMPLE 1 was prepared.

(Pressing of a polyethylene terephthalate film layer 24)

After preheating the manufactured pressed sheet at a temperature of

150 to 170 °C, the polyethylene terephthalate film layer 24 under which certain patterns were imparted was positioned on the preheated sheet, laid up, and pressed at a pressure of 3 to 6 kgf/cm².

(Heat resistant UV coating treatment)

5 An urethane acrylate based heat resistant UV treating agent in which a heat resistant stabilizer and acryl beads were added and contained was coated on the polyethylene terephthalate film layer 24 pressed sheet to a coating thickness of 25 μ m, cured by an UV lamp in the non-oxygen curing method, thus forming a heat resistant UV coating layer 25 on the uppermost
10 layer. The final product thickness was 1.8 mm. This manufactured decorative floor covering is illustrated in FIG. 4.

EXAMPLE 3

(Manufacturing of a polyvinyl chloride resin substrate layer 10)

The same polyvinyl chloride resin substrate layer 10 as in the
15 EXAMPLE 1 was manufactured.

(Manufacturing of a polyvinyl chloride resin intermediate layer 23)

The same polyvinyl chloride resin intermediate layer 23 as in
EXAMPLE 1 was manufactured.

(Pressing of a polyvinyl chloride resin intermediate layer 23)

20 A polyvinyl chloride resin intermediate layer 23 sheet was pressed on a substrate layer 10 in the same method as in EXAMPLE 1.

(Manufacturing of a polyethylene terephthalate film layer 24)

The same polyethylene terephthalate film layer 24 as in the
EXAMPLE 1 was manufactured.

(Pressing of a polyethylene terephthalate film layer 24)

A half-finished sheet was manufactured by pressing the polyethylene terephthalate film layer 24 on a sheet in which a polyvinyl chloride resin intermediate layer 23 was pressed on the polyvinyl chloride resin substrate
5 layer 10 manufactured in the same method as in EXAMPLE 1.

(Manufacturing an adhesive layer 32)

A 0.1 mm thick adhesive layer 32 was manufactured by rolling vinylacetate resin using a 4 roll calender at 120 °C.

(Pressing of an adhesive layer 32)

10 After preheating the polyethylene terephthalate film layer 24 pressed half-finished sheet at a temperature of 150 to 170 °C, the adhesive layer 32 was positioned under the preheated half-finished sheet, laid up, and pressed at a pressure of 3 to 6 kg/cm².

(Manufacturing of a cork balance layer 33)

15 A sheet which was cut to a thickness of 1 mm with a slicing machine after a cork layer of a natural tree was peeled off, pulverized to a particle size of 5 to 10 meshes, put into a large cylinder together with 5 weight% of vinyl acetate adhesive per cork weight, and bonded by applying pressure.

(Pressing of a cork balance layer 33)

20 The cork balance layer 33 was positioned underneath a half-finished sheet under which the adhesive layer 32 is pressed, laid up, and pressed at a pressure of 3 to 6 kg/cm².

(Heat resistant UV coating treatment)

An urethane acrylate based heat resistant UV treating agent in which a heat resistant stabilizer and acryl beads were added and contained was coated on the pressed sheet to a coating thickness of 25 μm , cured by an UV lamp in the non-oxygen curing method, thus forming a heat resistant UV coating layer 25 on the uppermost layer. The final product thickness was 2.0 mm. This manufactured decorative floor covering is illustrated in FIG. 5.

EXAMPLE 4

(Manufacturing of a polyvinyl chloride resin substrate layer 10)

The same polyvinyl chloride resin substrate layer 10 as in the
10 EXAMPLE 1 was manufactured.

(Manufacturing of a polyvinyl chloride resin intermediate layer 23)

The same polyvinyl chloride resin intermediate layer 23 as in
EXAMPLE 1 was manufactured.

(Pressing of a polyvinyl chloride resin intermediate layer 23)

15 A polyvinyl chloride resin intermediate layer 23 sheet was pressed on a substrate layer 10 in the same method as in EXAMPLE 1.

(Manufacturing of a polyethylene terephthalate film layer 24)

The same polyethylene terephthalate film layer 24 as in the
EXAMPLE 1 was manufactured.

20 (Pressing of a polyethylene terephthalate film layer 24)

A half-finished sheet was manufactured by pressing the polyethylene terephthalate film layer 24 on a sheet in which a polyvinyl chloride resin intermediate layer 23 was pressed on the polyvinyl chloride resin substrate layer 10 manufactured in the same method as in EXAMPLE 1.

(Manufacturing an adhesive layer 32)

A 0.1 mm thick adhesive layer 32 was manufactured by rolling vinylacetate resin using a 4 roll calender at 120 °C.

(Pressing of an adhesive layer 32)

- 5 After preheating the polyethylene terephthalate film layer 24 pressed half-finished sheet at a temperature of 150 to 170 °C, the adhesive layer 32 was positioned under the preheated half-finished sheet, laid up, and pressed at a pressure of 3 to 6 kg/cm².

(Manufacturing of a wooden powder balance layer 34)

- 10 A wooden powder balance layer 34 sheet was rolled to a thickness of 1 mm using a two sets of pressure rolls at a temperature of 130 to 170 °C after kneading 100 weight parts of polyvinyl chloride resin, 150 weight parts of wooden powder having a particle size of 200 to 300 meshes, 5 weight parts of heat resistant stabilizer barium-zinc based compound, 1 weight part
15 of internal antiadditive stearic acid, 30 weight parts of plasticizer dioctyl phthalate, and 5 weight parts of pigment.

(Pressing of a cork balance layer 33)

- The wooden powder balance layer 34 was positioned underneath a half-finished sheet under which the adhesive layer 32 was pressed, laid up,
20 and pressed at a pressure of 3 to 6 kg/cm².

(Manufacturing of fiber layer 35)

A polyvinyl chloride sol (plastisol) coated polyester nonwoven (thickness: 20s x 20s, density: 25 x 25 /inch) was prepared.

(Pressing of a fiber layer 35)

The fiber layer 35 was positioned underneath a half-finished sheet under which the cork balance layer 33 was pressed, laid up, and pressed at a pressure of 3 to 6 kg/cm².

5 (Heat resistant UV coating treatment)

An urethane acrylate based heat resistant UV treating agent in which a heat resistant stabilizer and acryl beads were added and contained was coated on the pressed sheet to a coating thickness of 25 μ m, cured by an UV lamp in the non-oxygen curing method, thus forming a heat resistant UV
10 coating layer 25 on the uppermost layer. The final product thickness was 2.0 mm. This manufactured decorative floor covering is illustrated in FIG. 6.

COMPARATIVE EXAMPLE 1

2.3 mm thick polyvinyl chloride resin decorative cushion floor covering

15 As a conventional 2.3 mm thick polyvinyl chloride resin decorative cushion floor covering, a Woodleum Plus product manufactured by LG Chemical Ltd. downwardly comprising an UV coating layer, a transparent layer, a printing layer, an upper foaming layer, a substrate layer, an underneath foaming layer, and a sizing layer was prepared.

20 The Woodleum Plus product was manufactured by the following method.

(Manufacturing of a substrate layer 10)

A substrate layer was manufactured by gelling at a temperature of 150 to 230 °C after depositing a sol made by mixing 100 weight parts of

polyvinyl chloride resin having a degree of polymerization of 2000, 10 to 100 weight parts of plasticizer, 1 to 20 weight parts of stabilizer, 1 to 20 weight parts of pigment, 1 to 50 weight parts of calcium carbonate, and other additives on a substrate such as glass fiber, vellum paper, or mineral material paper.

(Manufacturing of an upper foaming layer)

An upper foaming layer was manufactured by foaming at 170 to 250 °C for 30 to 180 seconds after coating a sol made by mixing 100 weight parts of polyvinyl chloride resin having a degree of polymerization of 2000, 10 to 120 weight parts of plasticizer, 1 to 20 weight parts of stabilizer, 1 to 20 weight parts of pigment, 1 to 20 weight parts of foaming agent, and other additives to a thickness of 0.1 to 0.2 mm on the substrate layer.

(Manufacturing of a printing layer and a transparent layer)

A printing layer was formed by printing certain patterns on the upper foaming layer using a gravure or offset ink, a rotary screen, and a transparent layer was manufactured by gelling at 170 to 230 °C for 30 to 180 seconds after coating a sol made by mixing 100 weight parts of polyvinyl chloride resin having degree of polymerization of 2000, 10 to 150 weight parts of plasticizer, 1 to 20 weight parts of stabilizer, and other additives to a thickness of 0.2 to 0.25 mm on the printing layer.

(Pressing of an underneath foaming layer and a sizing layer)

An underneath foaming layer was manufactured by foaming at 170 to 250 °C for 30 to 180 seconds after coating a sol made by mixing 100 weight parts of polyvinyl chloride resin having a degree of polymerization of 2000, 10

to 120 weight parts of plasticizer, 1 to 20 weight parts of stabilizer, 1 to 20 weight parts of pigment, 1 to 20 weight parts of foaming agent, and other additives to a thickness of 0.1 to 0.2 mm on the substrate layer, and a sizing layer was manufactured by gelling at 170 to 230 °C for 30 to 180 seconds

5 after coating a sol made by mixing 100 weight parts of polyvinyl chloride resin having degree of polymerization of 2000, 10 to 120 weight parts of plasticizer, 1 to 20 weight parts of pigment, 1 to 20 weight parts of stabilizer, 1 to 100 weight parts of calcium carbonate, and other additives to a thickness of 0.1 to 0.5 mm on the underneath foaming layer.

10 (Manufacturing an UV layer)

A UV layer was manufactured by UV curing unsaturated polyester resin, urethane acryl resin, epoxy acrylate resin, or polyester acryl resin on the transparent layer.

COMPARATIVE EXAMPLE 2

15 A decorative floor covering comprising a 3.0 mm thick polyvinyl chloride resin layer

As a conventional decorative floor covering comprising a 3.0 mm thick polyvinyl chloride resin layer, a Deco Tile manufactured by LG Chemical Ltd. downwardly comprising an UV layer, a transparent film layer, a printing

20 layer, an intermediate layer, a base layer, and a back layer was prepared.

(Manufacturing of a transparent film layer)

A 0.2 to 0.3 mm thick transparent sheet was manufactured by mixing 100 weight parts of polyvinyl chloride resin having a degree of polymerization of 800 to 1000, 10 to 40 weight parts of plasticizer, 1 to 20 weight parts of

stabilizer, and other additives, and sheeting in the continuous calendaring method.

(Manufacturing an UV layer)

An UV layer was manufactured by UV curing unsaturated polyester
5 resin, urethane acryl resin, epoxy acrylate resin, or polyester acryl resin on the transparent layer.

(Structure of other layers)

Other underneath layers were manufactured by an ordinary method, i.e., continuously calendaring non-foaming sheet layers, whereby each layer
10 was manufactured by heat pressing at a temperature of 130 to 160 °C.

The product thickness was 3 mm, and the thickness of a surface skin layer from an uppermost layer, i.e., an UV layer to a transparent film layer was 0.25 mm.

COMPARATIVE EXAMPLE 3

15 1.8 mm thick polyvinyl chloride resin non foaming decorative floor covering

As a conventional 1.8 mm thick polyvinyl chloride resin non foaming decorative floor covering, a Luckstrong manufactured by LG Chemical Ltd. downwardly comprising an UV layer, a transparent skin layer, a chip layer, a
20 substrate layer, a base sol layer, and a back layer was prepared.

The Luckstrong product was manufactured by the following method.

(Manufacturing of a substrate layer)

A substrate layer was manufactured by gelling at a temperature of 150 to 200 °C after depositing a sol made by mixing 100 weight parts of

polyvinyl chloride resin having a degree of polymerization of 2000, 10 to 100 weight parts of plasticizer, 1 to 20 weight parts of stabilizer, 1 to 150 weight parts of calcium carbonate, and other additives on a substrate such as glass fiber, vellum paper, or mineral material paper.

5 (Manufacturing of a base sol layer and a chip layer)

After manufacturing a base sol layer by coating a sol made by mixing 100 weight parts of polyvinyl chloride resin having a degree of polymerization of 2000, 10 to 50 weight parts of plasticizer, 1 to 20 weight parts of stabilizer, 1 to 20 weight parts of pigment, 1 to 50 weight parts of calcium carbonate,
10 and other additives to a thickness of 0.1 to 0.2 mm on the substrate layer, a chip layer was manufactured by arranging on the base sol layer chips having a size of 8 x 9 mm which were prepared after manufacturing a 0.8 to 1.2 mm thick transparent sheet by mixing 100 weight parts of polyvinyl chloride resin having a degree of polymerization of 800 to 1000, 10 to 40 weight parts of
15 plasticizer, 1 to 20 weight parts of stabilizer, 50 to 200 weight parts of calcium carbonate, 1 to 5 weight parts of pigment, and other additives, and sheeting in the continuous calendaring method.

(Manufacturing of a transparent skin layer)

A transparent skin layer was manufactured by gelling at 170 to
20 230 °C after coating a sol made by mixing 100 weight parts of polyvinyl chloride resin having a degree of polymerization of 1700 to 2000, 10 to 50 weight parts of plasticizer, 1 to 5 weight parts of stabilizer, and other additives to a thickness of 0.1 to 0.2 mm on the chip layer.

(Manufacturing an UV layer)

An UV layer was manufactured by UV curing unsaturated polyester resin, urethane acryl resin, epoxy acrylate resin, or polyester acryl resin on the transparent layer.

(Pressing of a back layer)

- 5 A back layer was manufactured by pressing with heat and pressure after manufacturing a 0.8 to 1.2 mm thick transparent sheet by mixing 100 weight parts of polyvinyl chloride resin having a degree of polymerization of 800 to 1000, 10 to 40 weight parts of plasticizer, 1 to 20 weight parts of stabilizer, 50 to 200 weight parts of calcium carbonate, 1 to 5 weight parts of
10 pigment, and other additives, and sheeting in the continuous calendaring method.

COMPARATIVE EXAMPLE 4

3.5 mm thick polyvinyl chloride resin decorative cushion floor covering

- 15 As a conventional 3.5 mm thick polyvinyl chloride resin decorative cushion floor covering, a Sharpeny product manufactured by LG Chemical Ltd. downwardly comprising an UV layer, a transparent layer, a printing layer, an upper foaming layer, a substrate layer, and a mechanical foaming layer was prepared.

- 20 The Sharpeny product was manufactured by the following method.

(Manufacturing of a substrate layer)

A substrate layer was manufactured by gelling at a temperature of 150 to 230 °C after depositing a sol made by mixing 100 weight parts of polyvinyl chloride resin having a degree of polymerization of 2000, 10 to 100

weight parts of plasticizer, 1 to 20 weight parts of stabilizer, 1 to 20 weight parts of pigment, 1 to 50 weight parts of calcium carbonate, and other additives on a substrate such as glass fiber, vellum paper, or mineral material paper.

5 (Manufacturing of an upper foaming layer)

An upper foaming layer was manufactured by foaming at 170 to 250 °C for 30 to 180 seconds after coating a sol made by mixing 100 weight parts of polyvinyl chloride resin having a degree of polymerization of 2000, 10 to 120 weight parts of plasticizer, 1 to 20 weight parts of stabilizer, 1 to 20 weight parts of pigment, 1 to 20 weight parts of foaming agent, and other additives to a thickness of 1.0 to 2.0 mm on the substrate layer.

(Manufacturing of a printing layer and a transparent layer)

A printing layer was formed by printing certain patterns on the upper foaming layer using a gravure or offset ink, a rotary screen, and a transparent layer was manufactured by gelling at 170 to 230 °C for 30 to 180 seconds after coating a sol made by mixing 100 weight parts of polyvinyl chloride resin having a degree of polymerization of 2000, 10 to 150 weight parts of plasticizer, 1 to 20 weight parts of stabilizer, and other additives to a thickness of 0.2 to 0.25 mm on the printing layer.

20 (Manufacturing of a mechanical foaming layer)

After manufacturing a sol by mixing 100 weight parts of polyvinyl chloride resin having a degree of polymerization of 1100 to 2000, 60 to 80 weight parts of plasticizer, 0 to 30 weight parts of calcium bicarbonate, 2 to 3 weight parts of stabilizer, and other additives, and putting the sol into a

mechanical foaming layer, and manufacturing a cream having a density of 0.3 to 0.7 g/cm³ by high speed agitating at 200 to 400 rpm while injecting air at 5 to 8 bar, a mechanical foaming layer was manufactured by coating the cream to a thickness of 2 to 3 mm on the substrate layer, and gelling at 160 to 200 °C.

(Manufacturing an UV layer)

An UV layer was manufactured by UV curing unsaturated polyester resin, urethane acryl resin, epoxy acrylate resin, or polyester acryl resin on the transparent layer.

10 EXAMPLE 5

(Transparency comparison)

In order to confirm vividness of printed patterns and transparency of a polyethylene terephthalate film layer 24 of the present invention, haze values of transparency of the polyethylene terephthalate film layer 24 of the present invention and conventional polyvinyl chloride sheet layer were measured more than 5 times by the method of ASTM D-1003, and their average values are represented in the following Table 1.

A polyethylene terephthalate film (SG88 manufactured by SK Chemical Ltd.) was used in a polyethylene terephthalate film of the present invention, a comparison polyvinyl chloride sheet was manufactured after manufacturing a sol by mixing 100 weight parts of polyvinyl chloride resin having a degree of polymerization of 2000, 10 to 50 weight parts of plasticizer, 1 to 20 weight parts of stabilizer, and other additives, coating the sol to a thickness of 0.2 mm, and gelling in an oven at 200 °C, and the

collected films of the sheet were used as samples.

[Table 1]

Classification	Polyvinyl chloride sheet	Polyethylene terephthalate film
Haze value	35 to 45	3 to 5

Transparency results on sheets

5 It can be found from the results that a polyethylene terephthalate film of the present invention has 10 or more times superior transparency than a polyvinyl chloride sheet. Therefore, since polyethylene terephthalate film has good transparency and uniform surface conditions, printing sharpness, realism, etc., and it can be raised in a decorative floor covering in which
10 patterns printed, this polyethylene terephthalate film was used in a surface layer 20.

EXAMPLE 6

(Heat resistance test)

After installing a conventional 2.3 mm thick polyvinyl chloride resin
15 decorative cushion floor covering, Woodleum Plus, of the COMPARATIVE EXAMPLE 1 and a 1.8 mm thick decorative floor covering of the EXAMPLE 2 on a general cement floor surface, it was measured whether damage of the product surface was shown per a period of time in the conditions that a lit cigarette and an unglazed earthenware bowl were put on each sample.

20 The results are represented in the following Table 2.

[Table 2] Heat resistance results per each structures

Classification		A decorative floor covering of COMPARATIVE EXAMPLE 1	A decorative floor covering EXAMPLE 2	Test conditions
Lit cigarette	When left laid parallel to a product	Carbonization after 30 seconds	No damages by 5 minutes	Tested with cigarettes having a size of 8 mm (diameter) x 83 mm (length)
	When a cigarette is crushed out	carbonized	No damages	
an unglazed earthenware bowl		Damaged after 3 seconds	Satisfactory until cooled	Tested by leaving boiling unglazed earthenware bowl on a product

It can be found from the results of the Table 2 that decorative floor coverings using a polyethylene terephthalate film 24 of the present invention and a polyvinyl chloride sheet substrate layer 10 containing a high content of a filler have superior heat resistance.

EXAMPLE 7

(Durability(abrasion resistance) test)

An abrasion amount of a surface skin layer having a thickness of 0.25 mm in a decorative floor covering having a conventional polyvinyl chloride resin layer, that is, a Deco Tile of COMPARATIVE EXAMPLE 2 was measured and compared to an abrasion amount of a polyethylene terephthalate film layer 24 having a thickness of 0.05 mm in a decorative floor covering of EXAMPLE 2 of the present invention, using a Taber abrasion test machine in accordance with KSF 2813 (the abrasion testing method of construction materials and composing components) in order to confirm durability of a decorative floor covering of the present invention.

10 The results are represented in the following Table 3.

[Table 3] Abrasion resistance tests for each structure

Classification	Decorative floor covering of COMPARATIVE EXAMPLE 2	Decorative floor covering of EXAMPLE 2
Abrasion amount (g)	0.61	0.047
0.1 mm thickness converted abrasion amount (g)	0.2	0.1

It could be found that a decorative floor covering of the present invention was improved in durability two or more times compared to a decorative floor covering having a conventional polyvinyl chloride resin layer from the results shown in the above Table 3.

EXAMPLE 8

(Weight comparison)

A weight per m^2 was 3.24 kg when a non-foaming decorative floor covering having a thickness of 2.0 mm was manufactured in COMPARATIVE EXAMPLE 3, while a weight per m^2 was 2.15 kg when a decorative floor covering having a thickness of 2.0 mm was manufactured in EXAMPLE 3 of
5 the present invention, confirming that 33.6% of weight reduction was realized in a decorative floor covering of the present invention compared to a conventional non-foaming decorative floor covering.

Furthermore, insect repelling effects, heat insulating effects, a humidity controlling function, impact absorbing effects, and sound blocking
10 effects in addition to the weight reduction can be expected from using a cork balance layer 33 in a back layer, and insect repelling effects, heat insulating effects, a humidity controlling function, and impact absorbing effects can be expected from using a wooden powder balance layer 34 in a back layer.

EXAMPLE 9

15 (Sound blocking test)

After installing a 2.3 mm thick conventional vinyl cushion decorative floor covering of the COMPARATIVE EXAMPLE 1, a 1.8 mm thick conventional non-foaming vinyl cushion decorative floor covering of the COMPARATIVE EXAMPLE 3, and a 2.0 mm thick decorative floor covering
20 of the EXAMPLE 3 on a 150 mm thick standard concrete slab, the sound blocking performance for a light floor covering impact was measured in accordance with KSF 2810 (the measuring method of floor impact sound at the building site) in order to confirm sound blocking effects of a decorative floor covering, and the measurement results are represented in the following

Table 4.

[Table 4] Sound blocking performance results on each structures

Structure	L-class	L-index	Single evaluation index (dB(A))	Improved amount of sound blocking performance
Standard concrete slab (150 mm)	L-75	74	75	Standard
Standard concrete slab (150 mm) + a decorative floor covering of COMPARATIVE EXAMPLE 1 (thickness 2.3 mm)	L-65	66.9	66.9	$\Delta 8.1$
Standard concrete slab (150 mm) + a non-foaming decorative floor covering of COMPARATIVE EXAMPLE 3 (thickness 1.8 mm)	L-65	66.9	66.9	$\Delta 8.1$
Standard concrete slab (150 mm) + a decorative floor covering of EXAMPLE 3 (thickness 2.0 mm)	L-50	50.1	50.1	$\Delta 24.9$

In the above Table 4, L-class represents a class showing a sound blocking degree according to the Japanese Industrial Standards, L-index represents showing a sound blocking degree according to the standards prepared by Korea National Housing Corporation, and single evaluation index represents a sound blocked sound pressure level.

It could be confirmed from the above Table 4 that a decorative floor covering of the present invention had superior sound blocking effects.

EXAMPLE 10

(Indentation test)

5 After applying a pressure with an indentation testing machine, an equipment of which the front end is a 6.3 mm hemispheric steel rod capable of applying a 133 N (13.6 kgf) load, for one minute in accordance with KSM 3506 (regulation on a vinyl floor sheet for a building molded of a main raw material of polyvinyl chloride resin) in order to confirm impact absorbing
10 effects of a decorative floor covering of the present invention, a indentation depth was measured by a dial gauge.

Indentation depths of a 2.3 mm thick conventional vinyl cushion decorative floor covering of the COMPARATIVE EXAMPLE 1, a 1.8 mm thick conventional polyvinyl chloride resin non-foaming decorative floor covering of
15 COMPARATIVE EXAMPLE 3, and a 2.0 mm thick decorative floor covering of EXAMPLE 3 of the present invention were measured and represented in the following Table 5.

[Table 5] Indentation results on each structures

Classification	2.3 mm thick decorative floor covering of COMPARATIVE EXAMPLE 1 (foaming)	1.8 mm thick decorative floor covering of COMPARATIVE EXAMPLE 3 (non- foaming)	2.0 mm thick decorative floor covering of EXAMPLE 3 (non- foaming)
Indentation depth (mm)	1.25	0.71	0.89

It could be confirmed from the results of the above Table 5 that there were 25.3% improved effects compared to a 1.8 mm conventional polyvinyl chloride resin non-foaming decorative floor covering although cushion characteristics were somewhat weaker than a 2.3 mm thick conventional foaming polyvinyl chloride cushion decorative floor covering.

EXAMPLE 11

Temperature differences according to time of a 3.5 mm thick conventional vinyl cushion decorative floor covering of COMPARATIVE EXAMPLE 4 and a 2.0 mm thick decorative floor covering of EXAMPLE 3 of the present invention were measured and represented in the following Table 6.

[Table 6] Heat accumulating effects on each structures

Time lapsed	3.5 mm thick vinyl cushion flooring of COMPARATIVE EXAMPLE 4		2.0 mm thick decorative floor covering of EXAMPLE 3	
	Temperature (°C)	Temperature difference (°C)	Temperature (°C)	Temperature difference (°C)
Product initial	54	-	49	-
temperature	42	12	39	10
1 hour	35	19	31	18
2 hours	31	23	27	22
3 hours	27	27	25	24
4 hours				

It could be confirmed from heat accumulating effect results on each structure of the above Table 6 that a 2.0 mm thick decorative floor covering of the present invention had 3 °C or more heat insulating effects than a 3.5 mm thick conventional vinyl cushion decorative floor covering.

A decorative floor covering of the present invention is a decorative floor covering which has superior surface heat resistance, printing sharpness and realism, and it can be installed conveniently since not only can non-foamed polyvinyl chloride resin be used as a substrate layer, but also the weight of the floor covering is light when a light weight back layer is comprised under the substrate layer.

While the present invention has been described in detail with

reference to the preferred embodiments, those skilled in the art will appreciate that various modifications and substitutions can be made thereto without departing from the spirit and scope of the present invention as set forth in the appended claims.

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WHAT IS CLAIMED IS:

1. A decorative floor covering downwardly comprising a surface layer,
and a polyvinyl chloride resin substrate layer, wherein the surface layer
5 comprises a polyethylene terephthalate film layer.

2. A decorative floor covering in accordance with claim 1, wherein the
polyethylene terephthalate film layer is a film in which a primer selected from
the group consisting of polyvinyl acetate based, polyurethane acrylate based,
and ethylene vinyl acetate based primers is coated to a film thickness of from
10 0.1 to 10 μm on top and bottom sides of the polyethylene terephthalate film
layer.

3. A decorative floor covering in accordance with claim 1, wherein a
thickness of the polyethylene terephthalate film layer is from 10 to 100 μm .

4. A decorative floor covering in accordance with claim 1, wherein the
15 polyvinyl chloride resin substrate layer is a non-foamed polyvinyl chloride
sheet comprising 100 weight parts of polyvinyl chloride resin, 50 to 400
weight parts of one or more inorganic fillers selected from the group
consisting of calcium carbonate, talc, wollastonite, and silica, or 5 to 30
weight parts of one or more metallic powders selected from the group
20 consisting of aluminum, copper, and iron as fillers.

5. A decorative floor covering in accordance with claim 4, wherein the
polyvinyl chloride resin substrate layer 10 is a non-foamed polyvinyl chloride
sheet manufactured by kneading a polyvinyl chloride resin composition
comprising 100 weight parts of polyvinyl chloride resin, a plasticizer of 30 to

50 weight parts of dioctyl phthalate, heat resistant stabilizers of 3 to 5 weight parts of barium-zinc based compound and 3 to 5 weight parts of epoxy compound, and fillers of 50 to 400 weight parts of calcium carbonate (CaCO_3) and 3 to 5 weight parts of pigment in a rolling mill having a temperature of 160 to 190 °C, and pressure rolling it to a thickness of 0.8 to 1.3 mm.

6. A decorative floor covering in accordance with claim 1, wherein the polyvinyl chloride resin substrate layer is comprised of glass fiber scrim, or woven or nonwoven glass fiber.

10 7. A decorative floor covering in accordance with claim 1 further comprising a light back layer beneath the substrate layer.

8. A decorative floor covering in accordance with claim 7, wherein the light back layer comprises one or more layers selected from the group consisting of a cork balance layer, a wooden powder balance layer, and a fiber layer.

15 9. A decorative floor covering in accordance with claim 8, wherein the cork balance layer is a sheet which is cut to a thickness of 1.0 to 2.0 mm with a slicing machine after a cork layer of a natural tree is peeled off, pulverized to a particle size of 5 to 10 meshes, put into a large cylinder together with adhesive, and bonded by applying pressure.

20 10. A decorative floor covering in accordance with claim 8, wherein the wooden powder balance layer is a sheet which is rolled to a thickness of 0.8 to 1.0 mm using a two sets of pressure rolls after adding 100 to 150 weight parts of wooden powder having a particle size of 200 to 300 meshes,

3 to 5 weight parts of heat resistant stabilizer barium-zinc based compound,
1 to 3 weight parts of internal antiadditive stearic acid, 30 to 50 weight parts
of plasticizer dioctyl phthalate, and 3 to 5 weight parts of pigment to 100
weight parts of polyvinyl chloride resin, and kneading all the components
5 together.

11. A decorative floor covering in accordance with claim 8, wherein
the fiber layer is selected from the group consisting of woven or unwoven
polyester, woven or unwoven polypropylene, and woven or unwoven glass
fiber, the woven thickness being from 10s x 10s to 25s x 15s, and the density
10 being from 20 x 20 to 30 x 30 roll/inch.

12. A decorative floor covering in accordance with claim 1
comprising:

- i) a surface treated layer;
- ii) a polyethylene terephthalate film layer;
- 15 iii) a polyvinyl chloride resin intermediate layer;
- iv) a polyvinyl chloride resin substrate layer;
- v) an adhesive layer; and
- vi) a light back layer.

13. A decorative floor covering in accordance with claim 12, wherein
20 the surface treated layer of i) is a layer in which a surface treated layer
composition comprising a resin selected from the group consisting of
urethane acrylate, silicone acrylate, and epoxy acrylate is coated on the
polyethylene terephthalate film layer, and cured with ultraviolet rays.

14. A decorative floor covering in accordance with claim 13, wherein the surface treated layer composition further comprises an acryl based or urethane based bead having a particle size of 5 to 20 μm .

15. A decorative floor covering in accordance with claim 12, wherein
5 the polyvinyl chloride resin intermediate layer of ii) is a sheet having a thickness of 0.1 to 1 mm manufactured by pressure rolling in a calender a polyvinyl chloride resin composition comprising 100 parts of polyvinyl chloride resin, 25 to 50 weight parts of dioctyl phthalate, 50 to 150 weight parts of calcium carbonate, 3 to 5 weight parts of titanium oxide, and 2 to 5 weight
10 parts of heat stabilizer.

16. A decorative floor covering in accordance with claim 12, wherein the total thickness of the i) surface treated layer, ii) polyethylene terephthalate film layer, iii) polyvinyl chloride resin intermediate layer, iv) polyvinyl chloride substrate layer, and v) adhesive layer is from 1 to 1.5 mm.

15 17. A decorative floor covering in accordance with claim 12, wherein the adhesive layer of v) is a sheet in which urethane resin, acrylic resin or vinylacetate resin is rolled to a thickness of 0.03 to 0.2 mm using 4 calender rolls at a temperature of 80 to 160 $^{\circ}\text{C}$, an impregnated sheet, or a plastisol coating gel.

20 18. A method for manufacturing a decorative floor covering comprising a surface layer downwardly comprising a surface treated layer, a polyethylene terephthalate film layer, and a polyvinyl chloride resin intermediate layer, and a polyvinyl chloride resin substrate layer comprising

the steps of:

- a) manufacturing a polyvinyl chloride resin substrate layer;
- b) manufacturing a pressed sheet by laying up a polyvinyl chloride resin intermediate layer on the substrate layer of step a), applying
5 pressure, and pressing;
- c) manufacturing a half-finished sheet by laying up a polyethylene terephthalate film layer under which a certain pattern is printed on the pressed sheet of step b), applying pressure, and pressing; and
- d) forming a surface treated layer by coating a surface treated layer
10 composition on the half-finished sheet of step c) and UV (ultraviolet ray) curing.

19. A method for manufacturing a decorative floor covering in accordance with claim 18, wherein the pressing of step b) is carried out after preheating a substrate layer to a temperature of 140 to 170 °C before laying
15 up a polyvinyl chloride resin intermediate layer.

20. A method for manufacturing a decorative floor covering in accordance with claim 18, wherein the pressing of step c) is carried out after preheating a pressed sheet to a temperature of 140 to 170 °C before laying up a polyethylene terephthalate film layer 24.

20 21. A method for manufacturing a decorative floor covering in accordance with claim 18, wherein the polyethylene terephthalate film layer of step c) is a film in which a primer selected from the group consisting of polyvinyl acetate based, polyurethane acrylate based, and ethylenevinyl acetate based primers is coated to a film thickness of 0.1 to 10 μm on top

and bottom sides of the polyethylene terephthalate film layer.

22. A method for manufacturing a decorative floor covering in accordance with claim 18, wherein the polyethylene terephthalate film layer of step c) has a thickness of 10 to 100 μm .

5 23. A method for manufacturing a decorative floor covering in accordance with claim 18, wherein the polyvinyl chloride resin substrate layer of step a) is manufactured by kneading a polyvinyl chloride resin composition comprising 100 weight parts of polyvinyl chloride resin, 50 to 400 weight parts of one or more inorganic fillers selected from the group consisting of
10 calcium carbonate, talc, wollastonite, and silica, or 5 to 30 weight parts of one or more metallic powders selected from the group consisting of aluminum, copper, and iron as fillers in a rolling mill of 160 to 190 $^{\circ}\text{C}$, and rolling to a thickness of 0.8 to 1.3 mm.

24. A method for manufacturing a decorative floor covering
15 comprising a surface layer downwardly comprising a surface treated layer, a polyethylene terephthalate film layer, and a polyvinyl chloride resin intermediate layer, a polyvinyl chloride resin substrate layer, and a light back layer comprising the steps of:

- a) manufacturing the first polyvinyl chloride resin substrate layer;
- 20 b) pressing while applying pressure in a embossing roll after positioning a glass fiber scrim, or a woven or unwoven glass fiber underneath the first substrate layer 10 under the condition that a surface of the first polyvinyl chloride resin substrate layer 10 of step a) maintains latent heat of 100 to 150 $^{\circ}\text{C}$;

- c) manufacturing the second polyvinyl chloride resin substrate layer;
- d) coating a plastisol underneath the second polyvinyl chloride resin substrate layer, positioning a light back layer of a fiber layer, applying pressure, and pressing with a press roll at a heating drum at 140 to 150 °C;
- e) manufacturing a polyvinyl chloride resin intermediate layer;
- f) manufacturing a pressed sheet by applying pressure at a press after downwardly positioning a polyvinyl chloride resin intermediate layer, the first polyvinyl chloride resin substrate layer under which glass fiber scrim, or woven or unwoven glass fiber is pressed, the second polyvinyl chloride resin substrate layer under which a light back layer of a fiber layer is pressed, and preheating to a temperature of 140 to 170 °C;
- g) manufacturing a half-finished sheet by applying pressure and pressing at an embossing roll after preheating the pressed sheet of step f) to a temperature of 140 to 170 °C and positioning a polyethylene terephthalate film layer on a polyvinyl chloride resin intermediate layer; and
- h) forming a surface treated layer by UV (ultraviolet rays) curing after coating a surface treated layer composition on the half-finished sheet of step g).

25. A method for manufacturing a decorative floor covering in accordance with claim 24, wherein the polyethylene terephthalate film layer of step g) is a film in which a primer selected from the group consisting of

polyvinyl acetate based, polyurethane acrylate based, and ethylenevinyl acetate based primers is coated to a film thickness of 0.1 to 10 μm on top and bottom sides of the polyethylene terephthalate film layer.

26. A method for manufacturing a decorative floor covering in accordance with claim 24, wherein the polyethylene terephthalate film layer of step g) has a thickness of 10 to 100 μm .

27. A method for manufacturing a decorative floor covering in accordance with claim 24, wherein the first polyvinyl chloride resin substrate layer 10 of step a) and the second polyvinyl chloride resin substrate layer of step c) are manufactured by kneading a polyvinyl chloride resin composition comprising 100 weight parts of polyvinyl chloride resin, 50 to 400 weight parts of one or more inorganic fillers selected from the group consisting of calcium carbonate, talc, wollastonite, and silica, or 5 to 30 weight parts of one or more metallic powders selected from the group consisting of aluminum, copper, and iron as fillers in a rolling mill at 160 to 190 $^{\circ}\text{C}$, and rolling to a thickness of 0.8 to 1.3 mm.

28. A method for manufacturing a decorative floor covering comprising a surface layer downwardly comprising a surface treated layer, a polyethylene terephthalate film layer, and a polyvinyl chloride resin intermediate layer, a polyvinyl chloride resin substrate layer, and a light back layer comprising the steps of:

- a) manufacturing a polyvinyl chloride resin substrate layer;
- b) laying up a polyvinyl chloride resin intermediate layer on the preheated substrate layer of step a), applying pressure, and

pressing;

- c) manufacturing a half-finished sheet by laying up a polyethylene terephthalate film layer on the preheated polyvinyl chloride resin intermediate layer of step b), applying pressure, and pressing;
- 5 d) laying up an adhesive layer underneath the preheated half-finished sheet of step c), applying pressure, and pressing;
- e) laying up a light back layer underneath the adhesive layer of step d), applying pressure, and pressing; and
- f) forming a surface treated layer after coating a surface treated layer composition on the pressed polyethylene terephthalate film layer of
- 10 step e), and curing.

29. A method for manufacturing a decorative floor covering in accordance with claim 28, wherein the laying up and pressing of the light back layer is laying up and pressing a fabric layer underneath a wooden powder balance layer after laying up and pressing a cork balance layer

15 underneath an adhesive layer, or laying up and pressing a wooden powder balance layer underneath an adhesive layer.

30. A method for manufacturing a decorative floor covering in accordance with claim 28, wherein the polyethylene terephthalate film layer

20 of step c) is a film in which a primer selected from the group consisting of polyvinyl acetate based, polyurethane acrylate based, and ethylenevinyl acetate based primers is coated to a film thickness of 0.1 to 10 μm on top and bottom sides of the polyethylene terephthalate film layer.

31. A method for manufacturing a decorative floor covering in

accordance with claim 28, wherein the polyethylene terephthalate film layer of step c) has a thickness of 10 to 100 μm .

32. A method for manufacturing a decorative floor covering in accordance with claim 28, wherein the polyvinyl chloride resin substrate layer of step a) is manufactured by kneading a polyvinyl chloride resin composition comprising 100 weight parts of polyvinyl chloride resin, 50 to 400 weight parts of one or more inorganic fillers selected from the group consisting of calcium carbonate, talc, wollastonite, and silica, or 5 to 30 weight parts of one or more metallic powders selected from the group consisting of aluminum, copper, and iron as fillers in a rolling mill of 160 to 190 $^{\circ}\text{C}$, and rolling to a thickness of 0.8 to 1.3 mm.

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図 1

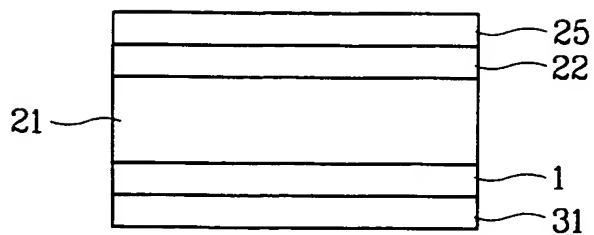


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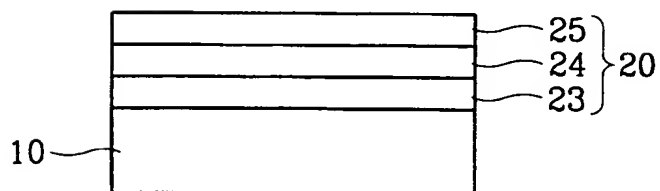
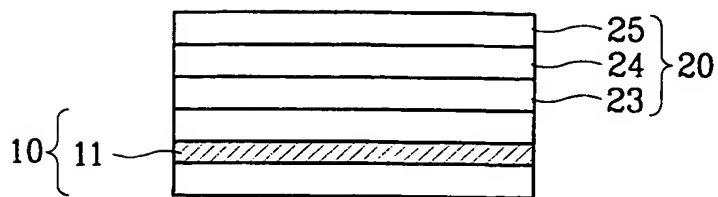


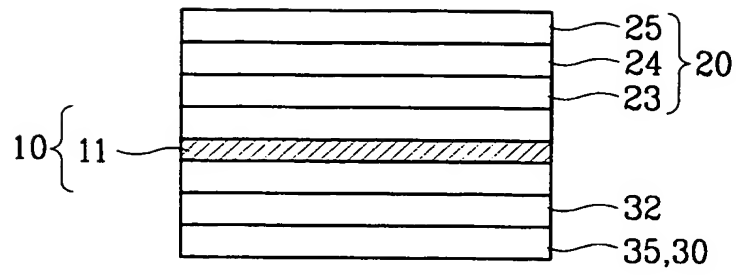
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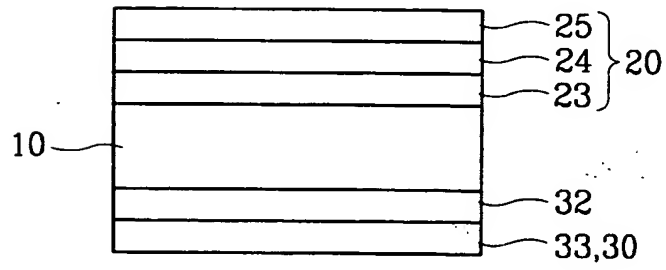
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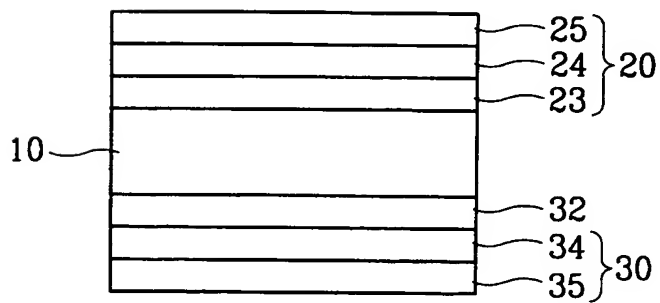
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR00/00664

A. CLASSIFICATION OF SUBJECT MATTER**IPC7 B32B 27/18**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 B32B 27/08, B32B 27/00, B32B 33/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Patents and Applications for Invention since 1975

Korean Utility Models and Applications for Utility Models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NPS, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 08-174783 A (Dainippon Printing Co., Ltd.) See Claim1-9, Fig.1-2	1
A	KR 97-33802 A (Hyundai Motor Co., Ltd.) See Abstract, Claim1-3	1
A	KR 94-13816 A (Lucky Co., Ltd.) See Abstract, Claim1-10, Fig.1-4	1

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

09 OCTOBER 2000 (09.10.2000)

Date of mailing of the international search report

10 OCTOBER 2000 (10.10.2000)

Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR00/00664

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 08-174783	09.07.96	None	
KR 97-33802	22.07.97	None	
KR 94-13816	16.07.94	None	